241 With respect to these habitat conditions, the single most important, and, in the case of the Yaruro, predominant subsistence activity is swidden-ing, also called brand tillage, slash and burn horticulture, milpa, or shifting horticulture, a type of subsistence which peoples in both tropical and temperate forested areas of the world have practiced and still practice widely. The procedure followed by the Yaruro is very much like that of other swiddeners.[A] A garden site is chosen in virgin forest or preferably in second growth. During the dry season, the underbrush is first cut out and then the larger trees are felled by a variety of techniques including the use of machetes, axes, or girdling. The cut trees and brush are left to dry during the remainder of the dry season. Just as the first rains are approach-ing, these logs, along with whatever smaller underbrush may be standing, are set afire. The smaller materials largely burn up while the charred remnants of large trees lie scattered about. Burning partially destroys the
[134] humus, as does removal of the forest cover, and to a degree disturbs the soil structure,[A] consequently often speeding the decline of soil fertility despite the addition of organic material from the rotting of partially burned tree boles. Also ash from the burned wood contributes some fertilizing minerals to the soil, thus increasing the short-term fertility of the soil before it is exhausted by man, plants, and rain.

134 The destruction of the forest cover and of the humus layers exposes
241 the plots to more drastic leaching or erosion by tropical rains. This fact, together with a decrease in fertility from continual replanting and harvesting in unweeded and uncultivated soils, accompanied by a gradual but drastic invasion by weeds and grasses, makes further use of the plot uneconomical at best and impossible at worst. It is abandoned in favor of some entirely new plot or one which has been reconstituted by long fallowing. Abandoned plots overgrown by weeds and grasses, though they may soon recover their fertility, are so difficult to work with the characteristic swidden horticul-tural tools,[A] the digging stick and the machete, that they generally cannot be recultivated until a new forest cover has grown up and shaded out smaller vegetation. This usually takes a number of years, in general a minimum of 10 to 15 years, though, in other parts of the world this range may be extended in both directions.[A]

241 Planting is carried out beginning just before or just at the inception of the rains and just after the burning. It may be continued at intervals during the rainy season in order to stagger the harvests. Plantings may be staggered through part or all of the dry season, if climate and horticultural conditions permit, to create a more or less continuous crop, and the probability of a correspondingly higher annual productivity per capita and per land area. Where marked differences between seasons are not found, the entire process may be more or less continuous throughout the year. Irrigation, terracing, and fertilization (other than natural fertilization resulting from silting) are not used.

311 The remaining land surface presents resource areas of various types. In passing, it should be noted, though it is too often thought to be self-evident and consequently not specified, that what constitutes a resource

[A] 3, 4, 5, 6 [for footnote see category 116, p. 42--Analyst]

area is only such in reference to the presence of a given technology. The presence of such a technology is not guaranteed in any particular culture by any historical, evolutionary, geographical, or ecological necessity. Its presence may entail a particular historical explanation or a general evolutionary one. In any case, its absence entails the absence of the use of certain resources whose presence we can observe only in retrospect. 311

Other resource areas besides those utilized because of the presence of horticulture among the Yaruro become available by their possession of hunting, gathering, and fishing technologies, as well as recently acquired animal husbandry in the form of pig-herding. Hunter animals include deer, armadillo, capybara, paca, peccary (?), iguana, and a number of birds (see Table II, p. 4)[k]. These are variously distributed spatially according to the specific ecological niches for which they are adapted. Thus deer are apparently usually found dispersed in the somewhat damper, low-lying savanas where grass is greener and water more available away from the scene of human activity. Armadillo are found distributed throughout the savana. Other species, however, such as the capybara, live near the edge of permanent waters, mainly the rivers. Alligators also live only in the rivers. The faunal carrying capacity of the savanas appears to be quite low in the Cinaruco llanos since foraging foods for larger game animals are sparse. It is important to note that not only is the overall carrying capacity governed by the minimum average food supply of the savanas in the florally more restricted dry season,[l] but the distribution of animals varies considerably from the wet to the dry season. In the latter, animals tend to cluster nearer the rivers or the widely dispersed water holes. Consequently, the locus of hunting must also shift seasonally (see Maps)[a] Savana hunting techniques are neccessarily different from those used in procuring food in the rivers, whether hunting alligators or capybara, or, of course, fishing. There is some seasonal variation in the locus of fishing, too, although this is much less marked on the Cinaruco than on the freely-flooding streams of the flatter, more north-easterly savanas of the Apure llanos. In the rainy season, fish move up the larger streams into somewhat shallower waters where more plant and insect food is available to them. However, they are apparently unable to move up smaller streams which often have rapids-like stretches interrupting their course. Thus fishing in the rainy seasons is directed towards the larger creeks and away from the smaller creeks and the river itself, where the water has become too deep for successful fishing since the fish are scarcer and more difficult to see in the deep, swift currents of winter. In respect to animal husbandry, recently introduced pigs are pastured anywhere in the savanas but preferably next to the village or quite a distance from it, in either case far from the nearest gardens (Sp. *conuco*, Y. *tadó*), an effort which is rarely successful, since the pigs, in their wisdom, are among the main predators on the garden crops. Gathering may be carried out in the dry or the wet savana depending upon the plant food to be gathered, or it may be carried out near the creeks especially for the fruit of the moriche palm. The rivers do not appear to be used in gathering. 224 137 [221] 226 133 231 [241] 222

k'[See pp. 35-37, category 116 --Analyst]
l[a][See pp. 40-41, category 102 --Analyst]
l[7][for footnote, see p. 42, category 116 --Analyst]

311 In short, the habitat conditions are as follows, given that the Cinaruco
22 Yaruro have a technology including hunting, gathering, fishing, and animal husbandry, and horticulture. All resources are found within a narrow band of about 4-5 miles between the Cinaruco river and the high sand dunes occurring in the interfluve to the north, in which only an occasional deer is found. Within this space there are three major resource areas distinguishable: 1) the open savanas for hunting and gathering, the former involving much greater dispersion of resources than the latter and consequently quite different techno-social conditions. Both activities change location markedly with the seasons. 2) The rivers and *caños* are used for water-animal hunting and for fishing. Fishing also displays a seasonal shift between river and *caño*, whereas river hunting for alligator and turtle becomes totally impracticable in the wet season. 3) The wooded areas, themselves dispersed, include the gallery forests of smaller streams where flooding is limited but water
● [241] and soil abundant and the *montes* occurring here and there in mid-savana. These areas provide the Yaruro with garden sites. Away from the streams, there are also occasional tiny patches of suitable soil not close enough to the water table for dry season use, but which get enough rain to be used for planting of seasonal crops in the wet season. Schematically, the situation is shown on Table II_4^1, a list of foods entering into Yaruro economy and their relative seasonal occurrences, and on Maps I and II_4^2 of the seasonal locations of these resources.

182 The particular relationship between a peculiar habitat, such as the one we have just described, and the technology operating within it, here preponderantly a swidden technology, sets upper limits to territorial, socio-economic, or cultural expansion, and limits to changes in socio-cultural forms. With regard to the habitat dimension of the relationship, we may
[121] say in Harris's words, "Limitations imposed by the manner in which plants and animals convert solar energy into comestible material in combination with the availability of land and water resources, the rate of reproduction of the natural biota, and the total ecological balance, furnish conditions unalterable by individual or collective whim",[3] at least with the given level of technological development possessed by the Yaruro. The Yaruro are in no position to change the total ecological balance, to increase the carrying capacity of the land or water for plant or animal species. For
182 example, under the llanos conditions, the use of slash-and-burn horticulture
241 exhausts arable land at a rate greater than it recovers. The proportion of land held in reserve for future cultivation must be several times greater
311 than that under cultivation at any given moment, the proportion varying with such factors as the rate of fertility recovery, the type of weed and grass invasion, the rate of growth of the secondary forest, the rate of mechanical reconstruction of the soil, and so on. Thus of the total amount of land potentially available in a given expanse of territory, only a part can be horticulturally exploited at any one time. Where the total potentially arable land in a given expanse is itself only a small proportion of the total area, the amount of land available for cultivation at any one moment is, of course, minute. This ecological balance in turn limits the human population

1[1] [See pp. 31-39, Category 116 -- Analyst]
1[2] [See pp. 40-41, Category 102 -- Analyst]
1[3] [For footnote, see p. 42, Category 116 -- Analyst]

and socio-economic forms. Nor can any immediate desire or fancy of the Yaruro change the limitations which the ecological relationship imposes: the carrying capacity of the land for horticultural food plants has, with the given technology, a fairly fixed upper limit. That such limitations exist for their horticulture is recognized by the Yaruro themselves to some extent. First, they recognize that, given the types of soils extant in the habitat, only certain kinds of crops can be used in certain places. Their knowledge in this regard seems to be quite accurate, and, of course, determines where a garden will be prepared at any given time according to projected needs, existing resources, and past exploitations. Again, they know that a swidden lasts three years, a fact not only confirmed by the evidence of conditions in recently abandoned patches but also by the results of soil analyses.[9] After the three years, they say, the swidden must be allowed to fallow for a number of years. They use the word 'five', but the writer believes 'five' is intended to mean 'some' years. The conditions of abandoned gardens, with their rank growth of lush grasses, unmanageable with dibble or machete, and of the places chosen for preparing new gardens, all cut out of relatively large second growth, suggest that the fallow period is at least 10 years, and probably upwards. We shall use 10 years as a basis for calculations below, since after such a time, the shade has driven out the succulent grasses which are replaced by herbaceous plants or woody underbrush. In view of these considerations, it may be said that Yaruro horticultural practices have been well-adapted to the particular soil and water conditions of their habitat on the basis of explicit recognition of these conditions.

Without basic change in their technology, the balance between the Yaruro's present technology and the habitat conditions we have described set real upper limits both on production and on productivity, the latter defined as production per capita per year, and therefore sets limits on the absolute size and the form of the society. Let us suppose optimal population conditions unlike the present continuing depopulation due to western diseases and massacres by Venezuelans were present as an hypothetical ideal state. The tendency of any plant or animal population is to increase until it balances in a stable equilibrium with the available nutritional resources, other factors constant.[10] If the population increases beyond this point, either a portion of the population must seek elsewhere for its food, or a portion must die, or the population will exploit the resources so as temporarily or permanently to reduce them to lower potentials, as in the case of cattle overgrazing pastures. A new land-population equilibrium is then reached at a somewhat lower level. The only other possibility is to innovate new forms of exploitation, a point we return to below.

Under optimal conditions, then, we may estimate maximum Yaruro population within the boundaries of such a territory as presently occupied by the Caño Totúdoro Yaruro of the Central Cinaruco, a territory bounded for all practical purposes by walking-and-working distance from the village. Within this area of about 65 sq. mi. a maximum of about 800 acres, or that 3% of the total area which is wooded, contains all tillable land. However,

9,10 [for footnotes see p. 42-48, category 116 -- Analyst]

311 within these 800 acres, much is occupied by the streams, calculated at their flood maxima which define non-gardenable areas, while other parts are
● 241 inadequate in soils or water for use as gardens. Consequently, the actually tillable areas comprise a maximum of about 200 acres or about 0.5% of the land surface. It should be noted, of course, that all these 200 acres are not usable for crops since those in the *montes* cannot be used for cane and bananas, while the wet areas nearest the streams cannot be used for corn or manioc. Thus the maximum area for the staple crops, manioc, corn, and bananas, is about 145 acres (see Table I)[1]. [11]

168 Using Carneiro's equations, [12] we may estimate the maximum population
311 which would be in equilibrium with this acreage, estimating .5 acres as an approximate amount of land required to provide the average person with the food he ordinarily derives from cultivated plants per year. [13] The calculation gives us 92 persons (see Figure 1). [14] We may also estimate the number of years (L) the group may stay in the present locality with its present population of 24 before wearing out the available tillable land so that they would have to move (see Figure 2). This would be 50 years. Since the entire fallow and planting cycle of any piece of land is only 13 years, under present circumstances, the Totúdoro Yaruro will not have to move from their present territory at all, in view of their small and decreasing population.

[128]

Figure 1

$$P = \frac{\frac{T}{(R+Y)} \times Y}{A}$$

$$P = \frac{\frac{200}{10+3} \times 3}{.5}$$

$P = 92$ (=67 if R is 15)

Figure 2

$$L = \frac{\frac{T}{P \times A}}{Y}$$

$$L = \frac{\frac{200}{24 \times .5}}{3}$$

$L = 50$ years

R = year of fallow
Y = years of productivity
A = land used to provide plant food for one person a year
P = population
L = number of years group located in one place
T = acres of cultivable land within walking-working distance of village

[262] The ideal figures given above would be somewhat modified upwards by the additional foods provided by fishing, hunting, and gathering which, in the wet season, constitute about 30% of the diet and, in the dry, perhaps

[1] [For Table I see pp. 28-30, category 116--Analyst]
[11,12,13,14] [For footnotes, see p. 43, category 116--Analyst]

182 First, through time, the gardens tend to radiate further and further from any given residence point since, given the 13-year planting-fallow
241 cycle, plots near the village will be exhausted. Since the major garden
361 resource areas lie in a crudely east-to-west direction, there will be a slow westward migration of the geographic center of garden activities, enough so that at some point, the village is suspended, as it were, among distant resource points (see Maps), and enhanced by the dispersed nature of the hunting and fishing, and to some extent the gathering, areas. If the "suspension" is weighted more in one direction than another, there will be some tendency either to move the village or to send out temporary or permanent branches of it, respectively in the form of work cottages in the swiddens or in larger long-term house groups which are intermittently occupied. This process is, in fact, easily observed among the Yaruro in existent and abandoned house and subsidiary village sites scattered over the whole territory. Similarly, the locus of gathering, so important in
[221] summer, moves further and further from the village. This, together with the considerable shift to fishing and river-hunting in summer, as well as the need for water, causes an extensive seasonal transhumance to occur within the territory. These factors contribute to fissioning as well as to inhibiting the development of permanently located villages, let alone larger aggregations. Thus, with a radiating ecology, a degree of group dispersion and geographical mobility within the territory is to be expected and is indeed characteristic of the Yaruro.

512 Second, if one examines the location of all resources it will be seen that, taken together, they constantly enjoin a dispersal of the labor force in all directions, regardless of season, so that more or less equivalent quantities of labor are being used at the same time in many varying kinds of productive activity independently of each other — at the peripheries of the territory, in the areas between, or in the village centers themselves,
[462] where the women are constantly doing the significantly important work of
[252] converting otherwise unusable food resources, like raw, bitter manioc or uncooked corn, into edibles.

476 Third, it will be noted that none of the Yaruro technological processes require cooperative work, even when they may permit it, if it were so desired. On the whole, the productive activities might be described as dispersive of labor, whether it is individuals or small groups of twos or threes who go out to keep each other company. Even the work of preparing
[241] the swiddens is carried out individually, though two or three men may
[463] work as neighbors in what appears as a single plot. Further, the technology is such as to require no highly specific and difficult or esoteric skills. The
[242] most difficult skill to acquire is the knowledge of the soil types and appropriate planting procedures attached to each. Thus, each adult is in a position to learn the inventory of technological knowledge appropriate
462 to his or her sex, and somewhat of that belonging to the other sex too, and
463 to apply it by himself whenever he wants or must. A man, well-instructed in Yaruro technology, could probably subsist alone successfully for long periods of time. One divorced adult man, although he was largely fed by his

mother's and sister's households, nevertheless hunted and harvested for himself, and often cooked for himself meals of the type ordinarily cooked only by women. 462 463

The forms and characteristics of surpluses, as defined by Harris, [16] shed further light on the structure of the ecology. The technological surplus, defined as the difference between total calories annually produced by any definable group and the calories used to produce them, or as the ratio between these two figures, may be estimated at about 8 or 9 to 1 as compared with Harris's estimated figures of 2:1 for the Sirionó or 33:1 for the Pencuyut Maya. [17] Since as Harris remarks, the degree of social stratification in a large number of cases correlates with the size of the technological surplus, we would scarcely expect to find social stratification among the Yaruro, nor even any significant ranking. Where the technological surplus is low, the producer's surplus, defined as the difference between total calories produced by any given group and the total calories used by the producers for all purposes must also be low. Therefore the number of persons other than producers who can be supported by the producers is also limited. The producers' surplus may provide an index of the degrees of specialization which might be expected. In the case of the Yaruro one would expect no, or very low, specialization. Again, with a low producers' surplus, one would expect to find a greater proportion of the group involved in production than where such surpluses are high, for otherwise there would be insufficient calories to support more than a few people other than the producers. With a low producers' surplus, one would expect, in general, to find a greater proportion of both sexes engaged in the food quest. This is, of course, born out in the case of the Yaruro. Finally, Harris's harvest surplus is defined as the difference between the amount produced at any given moment, especially at seasonal maxima, and the amount consumed at that time. The actual amount consumable is governed by the seasonal *minima*, since the population cannot rise higher than the food supply at minimum periods permits unless special technological features such as storage, are present. Where the harvest surpluses are of non-storable goods, the population level is in equilibrium with the absolute minima of the harvests. The greater the degree of storability through a nonproductive season, or the less marked a crop is by seasonality, the higher the level to which the minimum population can be raised as compared with the number of people supportable at levels of production comparable to those at the time of harvest. Storability, however, is only one dimension of the harvest surplus. Absolute size of the peak surpluses, their regularity over the years, their distribution in space and time in the annual cycle, their utility in raw form, and the proportion of labor needed to harvest them relative to the time allotted for the harvest are all important dimensions of the harvest surplus. Thus, manioc, the Yauro's chief food resource has no clear peak, is regular over the years (the Yaruro disclaim any famines), is storable both in raw form and in prepared forms, is, in the case of the Yaruro, so located as not to permit of a concentration of labor at any one time and needs no massive labor for harvesting because of short harvest periods. Thus, in general, the very nature of manioc as a crop, and the labor requisites for

121 433 182 [56] [463] [462] [262] [251] [241]

16, 17 [For footnotes see p. 43, category 116--Analyst]

harvesting it, require no centralized authority and render it possible and even probable that the management of production or distribution be carried on without it. The same may be said, on the whole, for all the hunting, fishing, and gathering harvests, a notable and probably permanent feature of Yaruro ecology. Perhaps the only crop which has a marked seasonality is corn, but its absolute size in the total production, its geographical distribution in production, and its position relative to all other harvests renders it insignificant as an effective promoter of managerial functions and formal arrangements of social stratification. It is unlikely, given Yaruro ecology that the forms of surplus would change; consequently their concomitants in social structure would remain constant.

On the basis of the formal characteristics of the ecology and of the surpluses one may deduce an essentially egalitarian social organization, with minimal ranking and leadership and with dispersion of the acts of economic distribution among a number of adult males or females any one of whom may produce a small harvest surplus at any time. With a relatively steady and reasonably comfortable total subsistence base, and with ecological arrangements which are spatially repeated in identical form up and down river, no necessity exists for stringent rules of local exogamy as an institution to regulate the labor force by redistributing its members. One would expect frequent marrying in the village according to the convenience of the contractants, and out-marriages to occur either as ecoomic opportunity offered elsewhere or lack of women at home urged one out. The combined biological and productive role of women, with their particularly important technical roles in gathering and in food preparation, suggest sedentary communities and a matrifocal emphasis in the rules of residence. However, the importance and location of the men's economic contribution might be expected to balance this to a degree so that one might deduce male uxorimatrilocal residence but with other, subsidiary patterns. This in fact occurs, occasional male matrilocality or patrilocality [A] comprising the subsidiary residence rules. Political authority would be vested in the community, mainly among its elders, since little or no ranking or stratification is to be expected. In fact, Yaruro socio-political forms, in general, conform to all of these deduced conditions. They represent a model for any society based on the kinds of ecological conditions or form of ecology we have described. Where the ecology is even more restricted the deduced characteristics should be matched even more closely by the observed data. In this respect, the Sirionó, for example, tend to confirm the hypothesis, in that their partial sedentariness which revolves about horticulture is associated with matrifocal social organization: matrilocality and matrilateral cross-cousin marriage. They also possess autonomous local communities.[18] [A] The Apinayé also tend to confirm the hypothesis.[19] [A]

Where our analysis permits us to predict about the course of the ecological conditions, we should also be able to extend this prediction to the social structure. Since, under the given ecology, we can establish a maximum population for each Yaruro socio-cultural unit, and under the given technology we would expect no significant change in the ecology, no significant

[A] 18,19,20 [For footnotes see pp. 43-44 category 116 --Analyst]

2:Leeds E-5 (1958)1961 SS19 Yaruro SS19

● 241 311

[p. 287]

TABLE I

Number, Size, and Crop Areas of Gardens of the Totudoro Yaruro: % [1] of Garden Planted to Each Crop and Areas in Acres.

Gardens #	Sq. Ft.	Acres		Manioc % Acres	Corn % Acres	Bananas % Acres	Cane % Acres	Squashes % Acres	Inyame % Acres	Other[2]
OLD: Totally abandoned (4th and 5th years)										
3.	15,000	0.35								
36.	10,000	0.23								
37.	15,000	0.35								
38.	8,000	0.19								
39.	8,000	0.18								
40.	12,000	0.28								
43.	10,000	0.23								
44.	10,000	0.23								
Total	88,000	2.04	2.04							
OLD: 3d and 4th years										
6.	13,500	0 31				sparse[3]				
8.	5 000	0.12				sparse				
11.	8,500	0.20				negligible				
12.	13,000	0.30				sparse				
16.	32,500	0.74				little				
20.	6,500	0.15		sparse						
41.	15,000	0.35				negligible				
42.	15,000	0.35				negligible				
Total	109,000	2.52	4.53							

TABLE I (cont.)

Gardens #	Sq. Ft.	Acres		Manioc %	Manioc Acres	Corn %	Corn Acres	Bananas %	Bananas Acres	Cane %	Cane Acres	Squashes %	Squashes Acres	Inyame %	Inyame Acres	Other[1]
25.	9,500	0.22		35	0.08	35	0.08	20	0.04	10	0.02	—	—	—	—	—
27.	1,950	0.05		—	—	—	—	—	—	—	—	200[7]	0.10	—	—	—
29.	2,500	0.06		100	0.06	100[8]	0.06	—	—	—	—	—	—	—	—	—
30.	15,000	0.35		80	0.28	80[9]	0.28	20	0.07	—	—	—	—	—	—	—
32.	13,000	0.30		—	—	—	—	—	—	100	0.30	—	—	—	—	—
33.	13,000	0.30		55	0.17	55[10]	0.17	20	0.06	20	0.06	—	—	10[11]	0.03	—
28b.	10,000	0.22		60	0.13	60[12]	0.14	30	0.07	10	0.02	10	0.02	—	—	+[13]
Total	142,950	3.29	14.61		1.26		0.84		0.65		1.09		0.12		0.07	Acres
IN PREPARATION																
2.	15,000	0.35		—	—	—	—	—	—	—	—	—	—	—	—	—
21.	20,000	0.46		—	—	—	—	—	—	—	—	—	—	—	—	—
Total	35,000	0.81	15.42													

1. These percents are highly approximate since crops were often distributed quite irregularly around gardens, often even interplanted. They represent impressionistic guesses.
2. These mostly include yautia ('ocumo'), pineapples.
3. 'Sparse' means that trees are scattered here and there, bearing lightly; 'negligible' refers to a few atrophied bunches in an entire patch; 'little' means a very small production, above sparse.
4. These were very sparse.
5. Pineapples, yautia.
6. Pineapples, pumpkins, yautia.
7. Successively planted to melons and squash in same season.
8. Double cropped in same area.
9. Corn and manioc double cropped in same area.
10. Corn and manioc double cropped in same area.
11. Inyame interplanted among corn and manioc.
12. Double cropped with manioc.
13. Yautia, pineapples, melons, pumpkins.

2:Leeds E-5 (1958)1961 SS19 Yaruro SS19

TABLE II

FOODS: THEIR GEOGRAPHICAL PROVENIENCES, TECHNIQUES AND SEASONS OF PRODUCTION; THE DIVISION OF LABOR IN PRODUCTION AND FOOD PREPARATION

Symbols: S,F W,S — summer, fall, winter, spring
M,F, — male, female
Q — evaluation of the quantitative importance of the food or raw material in Yaruro subsistence and productive activity: 5 — major staple or resource; 4 — major crop, but not a staple; 3 — important food (or other) resource, but a secondary crop; 2 — minor crop (or other resource) serving as a more or less regular but seasonal delicacy; 1 — mostly a delicacy for occasional enjoyment (very secondary resource)
yuca — indicates both presence, and by doubling or tripling importance of crop or resource; three *yuca yuca yuca*'s do not necessarily mean "3 times as important as 1 *yuca*", merely 'of outstanding importance".
/ — sporadically or slightly present
d-m — December to March; a — April; m-s — May-September; o-n — October to November.

Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	Prod. F	Food Prep. M	Food Prep. F	Q
CROPS PLANTED:												
ɲoe-ka'ra (1)	yuca amarga	bitter manioc	swiddens, cuttings, dibble	*yuca yuca yuca*	*yuca yuca yuca*	*yuca yuca yuca*	*yuca yuca yuca*	*yuca yuca yuca*	*yuca*		/ *yuca...*	5
1. p. ɲo-ka'ra	cachicamo	" (variety?)	as above									
2. p. a'punda''ki bɛ'rɛhɛri''a	cebita (?) (blanca)	" (light)	as above									
3. p. a'punda''ki-k'a'Ra	cebita (?) (obscura)	" (dark)	as above									
'hurari''à-'pae	yuca dulce	sweet manioc	as above	*yuca yu*	*yuca yuca*	*yuca yuca*	*yuca yuca*	*yuca yuca*	*yuca*		*yuca yuca*	4
1. p. ngui'kwɛ	yema de huevo	" (variety?)	as above									
2. p. ini'kwɛ	pata de zamuro	" (variety?)	as above									
3. p. valenciana	valenciana	" (", introd)	as above									

(1) Phonetics: *à*, etc. = nasalized vowel. *ə* = mid central unrounded vowel. *ch* = palatal c., y = palatalized fricative; *R* = flapped *r*, *ñ* = palatalized nasal continuant, as in English *sing*, *j* = palatalized affricate, as in English *Jeb*.

[p.31]

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Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	Prod. F	Food M	Prep. F	Q
pwɛ	maíz	corn, maize	swiddens, hills, dibble			≠≠≠	≠≠≠	≠≠≠	≠	≠	≠≠≠	4
1. pume'pwɛ	maíz yaruro	Yaruro corn	as above (3 mo., 1 ear/stalk)									
2. 'hamburu"apwɛ	maíz guahibo	Guahibo corn	as above (4 mo., 2 ears/ ")									
3. p. kwɛ'kwɛia	maíz amarillo	yellow corn	as above (5 mo., 1 ear/stalk)									
'parase"nä	plátano, topocho, banana	plantains, bananas	swiddens, machetes to cut on specially prepared mounds, slips	≠?	≠?	≠≠≠	≠≠	≠≠	/		≠≠	4
1. p. 'nä	plátano	plantain	as above (raw or cooked)								≠	
2. p. wo'kɔ	topocho	plantain	as above (raw or cooked)								≠	
3. p. wo'kwi	dos millites	banana	as above (raw or cooked)								≠	
4. p. ka'ru	?	plantain	as above (?)								?	
5. ecccha'mɛ p.	guineo (?)	plantain	as above (raw or cooked)								≠	
6. ka'mure	cambur	banana	as above (raw)									
hu'ra	fiame	yams	dry swiddens, dibble	≠?	≠?	≠	≠≠	/			≠≠	2
e'de	patilla	melons, pumpkins, squashes	swiddens dibble	≠≠	≠?	≠	≠≠	≠≠	/		≠≠	2
1. kwɛ"bohurariiede	"	water-melon	as above									
2. chumaniie.	"	pumpkins	as above									
3. 'yako"da	"?	bottle gourd	as above									
chenï'ä	caña	sugar cane	wet swiddens, dibble, machete	≠?	≠?	≠≠≠	≠≠≠	≠≠≠	≠	/		3
1. ch. mo'ra	caña ?	" (variety ?)	as above									
2. ch. bɛ'rebɛrei"a	caña blanca	white cane	as above									
	caña criolla	introd var.	as above									

2:Leeds E-5 (1958)1961 SS19 Yaruro SS19

Yaruro	Spanish	English	Location and Techniques	Season of Prod. S d-m	F a	W m-s	S o-n	Division of Labor Prod. M	Prod. F	Food M	Prep. F	Q
'cɛtamc"kwɛ	flam[illegible]	yams	swiddens, dibble	✓?	✓?	✓	✓	✓✓	/		✓✓	2
ôa"ri	batata	sweet potato	as above	✓?		✓?	✓	✓✓	/		✓✓	2
ô	ananá	pineapple	swiddens, dibble				✓	✓			/	1
ia	capacho	?	swiddens, ?				✓?	✓			1	?
cɛ'da (=cɛda"dakwɛ	ocumo (yauta)	xanthosoma	swiddens, dibble	✓?		✓	✓	✓			✓	2
(ñô'tɛa"nà	aji	chili pepper	doubtful if raised on Cinaruco)									
FISHES CAUGHT:												
yagu'pe	agua dulce	?	rivers, caños, hooks, arrows	✓				✓		/	✓	2-
ɛ(='chamachi"no)	cachama	?	rivers, hooks, arrows	✓				✓		/	✓	1
gui'te	sardina	?	rivers, fish arrows, small hook	✓	✓	✓	✓	✓		/	✓	2
dap'we	guavina	?	caño fishhooks	✓			✓	✓		/	✓	?
ho'nô	palambre	?	rivers, caños, arrows, hooks	✓?		✓	✓	✓		/	✓	2
ip:'à	pinte tigre	?	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	2-
pa'chowán"ti	bagre	catfish	rivers, caños, hooks	✓	✓	✓	✓	✓		/	✓	2-
'meô"dakwɛ	viejita	?	as above	✓	✓	✓	✓	✓		/	✓	?
'chôinda-"yu	"	?	as above	✓	✓	✓	✓	✓		/	✓	?
ninda'ô	"	?	caños, hooks, sardine bait	✓	✓	✓	✓	✓		/	✓	?
uji'ri-ka"Ri	" negra	?	caños, hooks	✓	✓	✓	✓	✓		/	✓	?
u'ru-u'ru	de tierra	?	rivers, hooks	✓	✓	✓	✓	✓		/	✓	?
da're	pavón	?	rivers, hooks, sardine bait	✓	✓	✓	✓	✓		/	✓	?

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[p. 33]

represent his people to the outside world without consultation and to make arbitrary decisions for them inside the community — mainly in his own interest — was, with the consent of the community, assassinated by one of the members, now in excellent standing in that community as a respected shaman. The chief in question had stepped beyond the bounds designated for his status. In sum, the position of chief, even though formally recognized by Yaruro society and reinforced by formal recognition and appointment by Venezuelan authorities, is feeble as an institution and as a status.[6] It is our hypothesis that ecological conditions of Yaruro life determine the form of the chieftainship in such a way that its stronger institutionalization would be impossible, and we turn to this question now.

III

Yaruro subsistence activities[7] comprise swiddening, gathering, pig herding, hunting and fishing, mentioned in the order of their importance as contributors to the total food supply as measured in calories.[8] Horticulture probably provides 60—70% of the total annual food supply. The horticulture practiced is characteristic of tropical forest slash-and-burn gardens, with a slow rotation of plots in order to permit soil renewal and weed control. Trees are cut, at present with steel axes and formerly, apparently, with axes of bone or shell, and then burnt. Occasional fences are roughly made of the logs to keep out pigs. Bitter manioc (*Manihot utilissima*),[9] in several varieties, is the main crop, though sweet manioc (*Manihot aipi*), also in several varieties, is planted too, as are corn, bananas, sugar cane — each in several varieties — and a number of lesser crops such as melons, squashes, pumpkins, pineapples, sweet potatoes, and yautia or ocumo (*Xanthosoma sagittifolium*). Crops are planted with a digging stick which may also be used in harvesting. Gardens are weeded, once only, early in the growth of the crops. Other than clearing, the only soil preparation is the construction of hills for planting bananas. This is done by burning hills made by a certain species of ants (*huachaquero*). The hills, which are quite wide and low, are filled with organic matter enriching the soil.[10] Harvesting is aided with baskets for carrying the crops. Baskets contain about half a bushel or less. No fertilization, no terracing, no drainage, no irrigation, no extensive turning of the soil is done.

The gathered resources include a number of roots, particularly changuango, changuanito, and guapo (*Marante arundinacea*);[11] varied fruits, especially that of

[6] Professor Benjamin N. Nelson informs me that in medieval Spain, village communities had an official, also called *capitan*, whose function was to treat with state functionaries representing the world beyond the village community's frontier. It is possible that the Yaruro capitan, and many others in Venezuela, are an acculturative transfer of this office to tribal groups. In the case of the Yaruro, this would have happened some 250—300 years ago.

[7] The use, here, of the terms 'activity', 'tasks', 'techniques', 'tools', 'resources', and 'habitat' corresponds to the definitions given in Leeds, 1960 b.

[8] Cf. Leeds, 1961, which gives this data in detail and describes the habitat and horticulture *in extenso*.

[9] Native terms for these crops are given *ibid.*

[10] *Ibid.*, note 9, contains data on soil values.

[11] Identifications are from Pittier, 1926.

and then shooting into the still side pools of a stream into which he has driven a post with bait attached. He may also stand in a canoe to shoot. It is reported, though I have not myself seen it, that barbasco (*Jacquinia revoluta* or *mucronulata*) poison is used by some Yaruro.[12] No nets, weirs, traps, sweeps, or artificial fish pools are used.

Given the techniques and tools of the Yaruro, all the subsistence activities described can conveniently be done by one person. Some *must* be done by one person only, since the tools and techniques themselves do not permit two or more persons to operate jointly. As it were, the logic of the tools and techniques concerned demands utilization by single persons.[13] Some of the tools and techniques might conveniently involve two or more persons, e. g. lashing tree trunks together to make a fence or cornering a capybara, but do not definitively *require* more than one person. Activities of all sorts may be done by aggregates of persons, each utilizing his own tools and techniques individually but neither the activity, the tools nor the techniques entail the aggregation of individuals. Thus, from the point of view of human organization, the technology, by itself, entails no managerial functions, no coordination of tasks which must be overseen by someone occupying an appropriately defined status.[14] That is, there are no technologically determined positions of leadership in Yaruro society. Further, the technology as such entails no significant cooperation in work organization, even when this is convenient, and correspondingly, no standard work groups or management functions, as represented in some defined status, for facilitating cooperation are to be expected or to be found. In fact, Yaruro technology and resource distribution are such as to elicit considerable dispersion of activities and actors at any given time of work, and to inhibit the development of rank and the personal acquisition of superordinating prestige.

IV

We may now examine the habitat aspect of the ecological relationship. A clearly marked annual cycle occurs in the Yaruro habitat.[15] However, despite a sharp seasonal change from heavy rains up to 60 inches in one half of the year to almost

[12] Personal communication from Mr. Thomas Rootes who has studied Yaruro linguistics for a number of months, having visited several groups.

[13] Different kinds of tools require different kinds of organization. A simple hand saw can be used by only one person at a time. A logging saw, though it can awkwardly be used by one person, is surely best used by two persons. Certain other saws, e. g. jig saws, make up one of a series of machine processes on a single part of a product, the entire series being the unit of operation which requires a still more complex level of organization. Cf. Leeds, 1960 b.

[14] For the structure of argument which is involved here, see Leeds, 1960 b.

[15] 'Habitat' here refers to all physical objects and conditions of the environment which are relevant to the existence or production of resources as defined by the culture. For the most part, then, 'habitat' refers to those environmental conditions such as humidity, temperature, insolation, rainfall, etc., which affect the food supply, as well as the food and water available for animals and plants and other culturally relevant physical objects. By extension, it refers to daily, seasonal, annual, and long-term variations and cycles in the various relevant factors of the environment, whether climatic, geologic, or biotic, which affect any of these supplies.

desert-like conditions in the other, temperature, sun, soil, and water-table conditions are such that plants will grow all year round, supplying a steady flow of vegetable foods to the people. The change of the water level in the rivers and in the water-table and the sharp increases and decreases of rain strongly affect the patterns of animal and plant life in the Yaruro environment. Annual cyclical variations in wind, humidity, and temperature are also quite marked. Plants and most especially animals, experience a kind of seasonal pulsation. As the rivers fill during the rainy season, the larger animals, such as the cayman, alligator, manati, and dugong, move upstream to somewhat shallower waters, where their food supply is easier of access. Fish also move upstream and even up small brooks, where this is possible. If the savannas flood, many fish swim out into the savannas where numerous insects and other foods are now to be found. The insects themselves multiply and are distributed farther and farther back from the rivers as the rains progress and the savanna floods widen. Meanwhile, foraging animals move farther from the rivers and ponds, and range over greater distances as the rains and the elevated water-tables foster greater plant food resources. Insects in part follow the animals, in part the vegetation as it wakens to winter life in the interfluves. As the dry season begins to return, the reverse process takes place, and all life concentrates nearer and nearer the permanent waters such as the big rivers and some lakes, or at points where the land surface is near enough the permanent water-table to maintain some vegetation, notably the gallery forests and the woodlots, called *montes* in Spanish. Thus one may ideally describe a summer and a winter organization of the habitat. The incidence of resources varies accordingly, and consequently so do the technological activities and tasks to be done. In the dry season, there is a marked increase of gathering, particularly of roots and seeds which appear to store starches for dry season use in the wet season, whereas fruits appear mainly in the rainy season. Hunting increases in the dry season when animals are more highly concentrated in and near the rivers and tributary brooks and streams. Fishing also increases in the dry season as the waters become shallower, less grass-choked, and no longer laden with muds from upstream erosion which makes it impossible to see the fish. Garden production appears to decrease in summer as the dry season precludes growing some crops, such as pineapples, altogether, and reduces the possibility of growing sugar cane and corn.

Despite this marked seasonality, the habitat conditions of both seasons resemble each other in certain formal respects vital to our argument.[10] First, at any given moment of either season, from the point of view of work organization, the resources are what we may call dispersive. Thus, in mid-rainy season, swiddens are to be found dispersed along the streams and brooks flowing into the rivers and these adits are distributed irregularly over the land within a distance of 4—5 miles of the river. Even low slip-off slopes of the river may be used for growing sugar cane in the wet season, though they are too dry in the dry season. Game, such as tortoise, armadillo, deer, birds, and occasional other animals, are to be found throughout the savannas and about the river banks. Fish are found in most streams and in the rivers including those which have no useful banks for horticulture.

[10] Cf. Leeds, 1961, for further details and maps of the seasonal resource locations.

3:Leeds E-5 (1958) 1962 S519 Yaruro S519

Gathered resources are found near the streams in marshy places where the moriche palm grows, and to a lesser extent in the savannas.[17] The dry season resources are also distributively located though the pattern is somewhat different. Quanta of production from these resources at any one time are rarely great. The larder, as it were, must be filled from a number of sources at once, even though one crop, particularly bitter manioc, and occasionally sweet manioc and corn, may rise briefly to as much as 50 or 60% of the food supply. Thus the available quanta of resources and their distribution at given moments in time are such as to demand a distributive form of labor organization: workers, as individuals or in very small groups, must go off in different directions at the same time. The obverse of this, of course, is that no sizable or permanent working groups are to be expected and none in fact occur. Further, because a dispersion of the labor force and a constant flux in the constitution of work groups is entailed by the relationships between the technology and the habitat, organized and permanent managerial functions can scarcely occur, and no fixed status with significant managerial powers would be expected. The observed data of leadership among the Yaruro and many other tribes in South America and other parts of the world, such as Melanesia, having fundamentally similar ecologies, corresponds precisely with what one is led to expect logically from the form of the ecology.

The absolute size of work groups achievable in the Yaruro habitat is limited not only by the dispersed locations and temporal harvest patterns of resources, but also by the absolute productivity of the ecology. If one calculates the distribution per land area of those calories potentially convertible to human energy, the rate of calories per unit of land surface is so low that even at maximum utilization only a very low population density of about 2 persons per square mile would be possible. If concentrated in the center of an effective walking distance for exploiting resources of, say, six miles radius from a village, with a resultant total area of about 110 square miles, there would be about 220 souls. Of these, perhaps 70% (all persons over age 10), at maximum, might constitute the labor force, i. e. 154 adults and older children. The actual conditions are, of course, much more limiting, since the efficiency of the technology is such that it cannot exploit the totality of calories potentially available for conversion to human energy at any one time.[18] The actually harvested calories are considerably less, though I have no estimates as to how much less. Let us estimate half, or enough to support one person per square mile, that is, 110 persons. With a somewhat smaller per cent of the population available for the labor force, say 60% of the 110, the force would have only about 67 persons at most. This appears to be a reasonable number for the Cinaruco Yaruro groups, although due to depopulation from disease and mas-

[17] *Ibid.*, Map I.

[18] *Ibid.*, Map II.

[19] For example, all the fish available in the streams at a given time cannot be caught. More could be caught with an improved technology, such as the use of fish traps, weirs, or fish poisons, which, as we have said, are absent from the technology of the Cinaruco Yaruro. Density of fish, or any other biotic population, can be estimated (cf. Dice, 1952, Ch. IV), and then compared with rates of harvesting. Furthermore, it should be noted that often the totality of an actually harvested resource may not be available. For example, in

sacre, the labor force actually observed in "my" group was a little more than 25% of that number, or 18, and neighboring groups were generally still smaller. These 154, 67, and especially the actual 18 workers, even if, at any given moment, *all* were working at subsistence activities, would be distributed over various parts of the 110 square miles of territory under the kind of dispersive habitat and technological conditions described. They are in fact so thinly scattered as to preclude any sort of continuing managerial functions.

V

A consideration of the forms of the harvest surplus[20] is relevant to our discussion. Harvest surpluses must be considered with respect both to individual subsistence resources and to all subsistence resources taken together. In the annual cycle, there is considerable variation in the amount produced of any given crop, except for sweet and bitter manioc which together constitute perhaps 40% of the annual food supply of the Yaruro. Manioc produces throughout the year. Given that the manioc-growing areas are widely dispersed and that considerable labor is drawn from manioc areas by still more dispersed resources, it follows that most work units for manioc gardens will consist of only one or two men, each having their own swidden or sharing it with one or two others to supply themselves and their immediate families throughout the year. As might be expected, land tenure and land usage patterns are in accord with this inference. Occasionally small oscillations in the manioc crops may produce small harvest surpluses. These, at least nominally, belong to the man in whose swidden they grow and are his for disposal. The quantities, however, are exceedingly small, and present no problems of storage or disposal necessitating more centralized supervision and allocation. Most other resources display a similar pattern though to an even smaller degree. Fish are obtainable, for the Cinaruco Yaruro, all year round with almost equal ease, though the Palmariteños have a more difficult time because of the grassy and muddy waters in the rainy season. Hunting windfalls and large pigs are the only animal sources which present harvest surpluses of any size. However, these are small enough so that they last at most two or three days, and they are so irregular both as to occurrence and as to personnel involved that no regular centralized institutional mode of handling them is entailed. The virtual absence of meat storage

the Trobriand Islands, in a good year, all the yams harvested cannot be eaten at once, nor can they be stored. Some portion of the crop is then lost by spoilage. We may construct, in terms of calories or other significant food values, two ratios:

$$\frac{C_h}{C_p} \qquad \frac{C_c}{C_h}$$

C — Calories
c — consumed
p — potential
h — harvested (= available for use)

The first may be used as a measure of the efficiency of the productive capacity of the technology; the second as a measure of the efficiency of the distributive capacity of the technology.

[20] The technological, producers, and harvest surpluses are defined in Harris, 1956, and implied in Harris, 1959. They are dealt with in detail with respect to the Yaruro in Leeds, 1961. Other relevant discussions of surplus are found Sahlins, 1958; Jacobs and Stern, 1952, Ch VI.

also inhibits any such development because it forces the immediate distribution of most of the meat of the slaughtered pig or captured game. There is no constantly or repeatedly stored supply to be supervised or allocated. In fact swine and windfall game, properly considered, correspond to the small oscillations of the manioc supply and are totally different from the regularly occurring massive incidence of food sources like buffalo herds, salmon runs, and wheat harvests of temperate climates or crab runs in the tropical Orinoco delta of Venezuela.[21]. Of all the food resources, the only one with a marked harvest surplus is corn. The significance of even this harvest surplus is reduced by a) the smallness of the quanta involved relative to the total food supply, and b) the fact that there are two corn seasons, one beginning in June, one about the beginning of February. Temporary harvest surpluses of corn may, however, contribute slightly to the enhanced prestige of those individuals who by their own will and work have been most productive.[22] They say with appreciation, "He is a hard worker", but the prestige is relevant only to the sphere in which it is gained. It does not necessarily give him prestige in some other spheres of cultural life, such as, for example, the ceremonial or decision-making activities.

In taking an overall view of the food resources, it will be noted that there are no clear harvest surpluses, and that the oscillations in supply, which are in truth minute and momentary harvest surpluses, are so small and irregular and varied in location as to be insignificant determiners of managerial functions. At most one might expect the harvest surplus of corn to elicit some small allocative function, generally none. Storage, too, in this case, is not a technique requiring administration as with wheat in grain elevators. It would in fact be better to consider this kind of storage as a steady presence of food rather than as storage at all, even though it functions as such.

The extra labor requirements of these small upward oscillations of the harvest surplus are likewise, in general, indistinguishable from regular labor requirements and are easily absorbed by individual workers. Or a worker may take along a child, who goes as much for the fun of being with his father or grandfather, but nevertheless carries back some produce. This type of situation is in sharp contrast with, say, the labor requirements of a large harvest surplus like the wheat crop in the United States which demands a large amount of labor quickly and temporarily. Such a harvest surplus entails a number of organizational problems foreign to the harvest oscillations.

[21] Personal communication from Johannes Wilbert who has done extensive fieldwork with the Warrau in the Amacuro Delta of the Orinoco River.

[22] Yaruro individuals differ in productivity not only because of inborn qualities such as strength and native abilities, but also by choice based on tastes. Some do not like to grow corn, others do not like to grow pigs, others still prefer to hunt or trade. The food quanta produced by these several activities vary greatly. The individual may exercise these choices in a cultural setting where any such choice benefits the community. All produce eventually finds its way into the community at large through the distribution mechanism. The person is not acting as an individualist regardless of the interest of others, but at his own optimum, given his unique person, in the community as a whole. Cf Fn 5 *supra*.

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221 Finally, the Yaruro deny any considerable long-term oscillations in the
262 environment and consequently in the resources. The extremes, particularly the minima, of habitat factors which regulate food and population balances, according to Liebig's Law, fall within narrow limits and again elicit no special institutions of management or of equilibrium maintenance to compensate for them, as in the case of the potlatches of the Northwest Coast of America, the buffalo hunts in the Great Plains of the United States, or the use of pigs in Melanesia.[22]

VI

868 One more point may be made regarding the ecology as limiter of chieftainship among the Yaruro. The tools, techniques, and resources require no very extensive, highly specialized or esoteric knowledge. In fact any man or woman, and any child as well, has access to such knowledge, and it is easily acquired by all members of the society who thus have, at least potentially, equal access to control over the means of life. There is no specialized knowledge, at least with respect to technology and habitat, which requires a specialized repository in the form of a chief or learned person. Yaruro knowledge, itself dependent upon the inventory of tools, techniques, and resources, inhibits any tendency towards the development of any
[463] sort of specialists in technical or managerial knowledge. As one might expect, there are no true specialists in Yaruro society. Here and there women make pots and certain women seem to have a special bent for making woven sacks but these
[756] are not properly specialities. Nor, from a technological or ecological point of view, is male or female shamanism in any way a speciality. They do not appear to be specialists even in esoteric knowledge. Knowledge of the general type described here might be called 'dispersive' or 'egalitarian' since it tends to become more or less uniformly distributed among the members of the society. A consequence of the existence of this type of knowledge, associated with the kind of technology described, is that there will be no specialised training of any specialists and, of course, no specialised personnel to do such training. This is the situation which obtains among the Yaruro both with respect to technical and managerial activities. Thus, in Yaruro knowledge, there is no source for the support of an institutionalized and strong chieftainship.

VII

221 In one respect, the ecology encourages chiefly functions. A balance is struck
● 241 between the cultural resources, the possibilities that the habitat affords for their
361 production, and the length of time that areas of land can be exploited. This is
622 particularly true of the horticultural lands since they can no longer be used after three years of cropping, and it becomes necessary to move on. The result is that there is a slow migration of resource areas, chiefly of horticultural areas across the tribal territory. The lands in cultivation move further and further from any given village until a point of suspension is reached at which the walking and working

[22] Cf. Suttles, 1960 a, 1960 b; Llewelly and Hoebel, 1941; Vayda, 1961; Vayda, Leeds, and Smith, 1961.

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distance of the gardens is too far from the village for effective or efficient exploitation. At this point a village or part of a village must move. Moving the villages involves decision-making with respect to time, new location, and so on. Plainly, moving a village involves a community decision. A community institution for handling the decision-making is necessary. Technologically speaking, the moving itself is not a community task and does not involve supervision and direction. Therefore, one would not expect the institution of decision-making to be a directive one, but a consultative one. Again this corresponds to the observed modes of action of the Yaruro chiefs. The chiefs' function is to facilitate the formation of the decisions of the community by funnelling and interpreting individuals' feelings and expressions to the rest of the members of the community.

In sum, I have presented a model of a form of ecology which, hypothetically, determines the limits within which any sort of chiefly functions may operate. This model, again hypothetically, is applicable to all cultures having the kind of technological and habitat characteristics and forms of surplus here described. I think the model applies particularly to cultures which grow root-crops such as manioc, which utilize no labor-concentrative techniques, such as irrigation, and for whose food resources notable seasonality is absent. Such cultures have been noted widely in tropical South America and also in Melanesia. In both areas, chiefly functions are notably limited as contrasted, say, with Circum-Caribbean corn-raising cultures with some irrigation and other intensive techniques [24] and with Polynesian high cultures with elaborate irrigation and other public works. [25] It should be noted, first, that the Yaruro were not far from these Circum-Caribbean chiefdoms and even show a number of trait similarities, and, second, that the Yaruro have been under Spanish acculturation, which has involved encouragement of chiefly functions, for probably 250 years. Yet, despite the pressures of both diffusion and acculturation to produce a more developed chieftaincy, the attenuated form described persists. The explanation of this persistence seems to me to be ecological. I suggest that the model of explanation presented here is based on a set of analytic dimensions — the characteristics of the technology, those of the habitat, those of the harvest surplus, and the interrelationships of these — which may be used for all cultures, but whose formal, systemic relations vary from culture to culture, or class of cultures to class of cultures, thus giving different models for different cultures or classes of cultures. By using such dimensions, one can account for cultural differences by means of a standard set of principles, thus faciliating genuine comparisons and generalizations.

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[24] Cf. Sturtevant, 1961; Reichel-Dolmatoff, 1961.
[25] Cf. Sahlins, 1958.

4: Leeds E-5 (1958) 1960 SS19 Yaruro SS19

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along the west-to-east flowing rivers in ribbons some kilometers wide. Most significant fauna and flora of economic use occur in these ribbons. This ecological distribution of resources governs subsistence activities whether they be mainly hunting, fishing, collecting, or horticulture.

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Yaruro subsistence comprises all these activities. (2). Horticulture in the rainy season appears considerably to outweigh all other sources of food together, but in the dry season, hunting, fishing, and collecting perhaps equal or outstrip horticulture. In any case, slash and burn gardening of manioc, corn, plantains, and a number of lesser crops is by far the single most important economic activity. The technology is exceedingly simple in all aspects of
[442]
production, the main tools being the machete and digging stick. The most elaborate technology occurs in the conversion of food into edibles and in the manufacture of hammocks, pottery, objects of wood such as canoes, and woven containers of all types.

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The economic organization displays a sharp division of labor between men's and women's work. Men do all hunting and fishing, make all objects of wood, haul lumber and householding materials, make hammocks, and carry out the heavy labor of gardening. Women do most of the collecting of roots,
[222]
seeds, and fruits. Since collecting contributes a substantial portion of the food supply in summer, woman's contribution, here, is of considerable communal importance. Women's work, a continuous activity from dawn to dusk, is, first, the conversion of raw foodstuffs into edibles. Second, women make all pottery, mats and baskets, the manioc squeezers, and much of the cord used to make hammocks. Another important contribution of women is their help in harvesting in the gardens. Men sometimes help the women with the cookery.

[476]
Men may work alone, in groups of 2 or 3, or in larger groups on rare occasions. No occasion exists for all men to work at a single task since there is no technological need for it. Women's work groups for collecting or householding are of similar size. Work group alignments are often based on choice or
[592]
accident but in other instances coresidence and kinship are determinants. The household, however, constitutes the only really necessary cooperative group for production. The man is a funnel for produce which the woman converts to

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[122]
(2) The present description applies to the Cinaruco River Yaruro where the major part of the writer's field work, supported by a grant from the Social Science Research Council, was done. The Capanaparo River Yaruro were reported by Petrullo (1939) and Le Besnerais (1948) as being hunters and gatherers, although Le Besnerais observed small horticultural patches which he claimed were diffusions from Venezuelan farmers which had occurred recently. Le Besnerais in 1954 states directly that they were horticulturalists, omitting any mention of possible diffusions from Venezuelans. The passing mention of horticulture by Fiasson (1947) confirms the present writer in his opinion that, although horticulture may be more restricted on the Capanaparo than on the Cinaruco and Cunaviche-Arauca (where the writer also spent several weeks) which are not discussed at all by Petrullo or Le Besnerais, nevertheless, the absence of horticulture is probably not aboriginal with the Yaruro as has been suggested by Kirchhoff (1948, p. 456). Rather the restricted gardening is a result of ecological conditions on the Capanaparo which are less favorable to horticulture than on the neighboring rivers, combined with extremely violent acculturation, including large-scale massacres of natives. The only other possibility, in my opinion,
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is that horticulture was introduced by the missionaries in the early part of the Eighteenth Century, which is certainly the period when the Yaruro first became acquainted with iron tools (cf Lodares, 1922).

/8 cont./

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5. This paragraph had been published when we learned of Anthony Leeds' articles (see "infra" IV List...42 and 43). The latter considers that agriculture, which exists among the Yaruro, as we acknowledge further along, was introduced by missionaries at the beginning of the eighteenth century.

descendants of the first inhabitants, hunters and gatherers who invaded South America at the beginning of the Neolithic Age, as Father Cooper suggests, or are they groups of Indians who after diverse vicissitudes have degenerated and adapted their civilization to a new way of life, as Levi-Strauss insists?"

121 Immigrants or not, hunters, fishers, and gatherers who evolved, or agriculturists who regressed, we shall not make a choice here between these alternatives and shall limit ourselves to presenting two observations which, gone into more deeply, will eventually permit opting in favor of one of the theses before us.

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241 1) The tropical savanna inhabited by the Yaruro, as a consequence of the absence of extensive forests, is hardly propitious for primitive agriculture. The latter could, however, be carried out there on a small scale.

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241 The Yaruro, in fact, and contrary to Vicenzo Petrullo's observations, are not only gatherers, fishers, and hunters, but also practice agriculture, in general on land cleared in the forest corridors. Petrullo probably did not observe this aspect of their way of life (6) because he carried out his investigations

6. We made, moreover, the identical error in the course of our first investigations (see "infra" IV List...40).

at the height of the dry season--when the soil /9/ is no longer

/9 cont./

productive and the Yaruro are living mainly on sandy shores, leading the life of fishers and nomadic gatherers--and limited them to the lower Capanaparo. There these Indians do not work the land, or at least very little; apparently for reasons linked with the proximity of Venezuelan peasants, such as: interdiction on the part of the latter who, with or without title, are masters of the land, the risk of being overrun by the free-roaming livestock, or simply work as peons on the farms, which would hardly allow them time to cultivate the land.

In fact, agriculture is only practiced on certain portions of their territory and particularly on those where they do not have contact with the Venezuelan peasants. This statement excludes at first sight the recent acquisition of it from the latter. Such a deduction is moreover corroborated by the accounts of the Jesuits (7) who lived for a while in the region in the eigh-

7. See "infra" IV List...2.

teenth century and who already described them as agriculturists--without specifying whether they had been before their arrival--and by the present Yaruro themselves, who affirm that they all formerly had conucos (8). But these points still do not

8. Kitchen gardens, in Venezuelan.

allow us to assert that they were in possession of the technique in the pre-Hispanic period.

2) The region, on the other hand; is rich in archaeological sites containing objects (pottery remains, figurines of baked clay and lignite, polished stone axes, funeral urns) which are of a completely different make from those made by the present-day Yaruro, who, moreover, do not recognize them as being of their making. Is it a question of remains of objects of forerunners or remains of objects of the Otomaco, who at the time of the Jesuits apparently lived in the present-day territory

7: Leeds E-4, 5 (1958) 1964 SS19 Yaruro SS19

Some Problems of Yaruro Ethnohistory*

Anthony Leeds

I was first led to consider Yaruro history because the ethnographic phenomena I found differed radically from those described by Petrullo (1939 *a*). Only historical research could resolve these differences. I shall first examine the discrepancies, then turn to the kinds of historical sources relevant to resolving the problems and to some of the material already examined, and, finally, briefly discuss the direction that the results appear to be taking.

I

Petrullo, describes the Yaruro of the Capanaparo River as being hunters of river and llanos animals, fishers of river fish, and gatherers of seeds, roots, and fruits. He denies the presence of horticulture, except among a few "acculturated" groups. As far as the monograph informs us, he visited only Yaruro near the mouth of the Capanaparo and on islands in the Orinoco during the months of the dry season. He did not visit the Arauca, Cunaviche, upper Capanaparo, Riecito, and Sinaruco rivers, on all of which Yaruro are found today, and apparently have been living indefinitely into the past, according to old maps.[1] On the basis of the groups visited, he asserts that the Yaruro were not horticultural. Kirchhoff (1948 *a*: 456) repeats this assertion, adding that Gilij (1780-1784: Vol. 3) mentions the use of green corn — a sign, according to Kirchhoff, of the recent adoption of corn at that time. No basis is given for this statement. Le Besnerais, in several publications (1948; 1950*a;* 1951; and, with Dreyfus-Roche, 1954), repeats that the Yaruro were hunters and gatherers, but, in his most recent work (1950 *b;* 1954; Ms.; Personal communication,

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1 Cf. maps listed in the special section of the bibliography, many of which show the location of the Yaruro, Otomaco, Achagua ("as Chaguas"), Sáliva, Aruaca, Caribe, or a number of other tribes at various points in history.

7: Leeds E-4, 5 (1958) 1964 SS19 Yaruro SS19

1939), on the basis of later field research, he completely rejects his previous stand.

In 1949, after his earlier publications, Le Besnerais (cf. 1954) made a census of the entire Capanaparo and Riecito rivers, discovering among other things:

A) That most Yaruro settlements had dry season locations on or near the river, banks or on the sand bars in the river, and wet season locations back from the rivers on higher sand dunes,

B) that there were corresponding house types for each kind of location,

C) that a great many of these settlements appear to have had two divisions mainly in the wet season locations — often at considerable distances from each other, sometimes very close,

D) that near all winter locations and in all settlements along the entire length of the Riecito and Capanaparo rivers gardens existed with standard crops mentioned in my own work (1961 *a*, 1962),

E) and, by implication, that these garden plots are not readily visible from the river nor from dry season locations.

Fiasson (1947), speaking of a trip probably made in 1945, mentions gardens for the Yaruro in the Capanaparo-Meta area. The missionary, Raymond Kook, showed me pictures in 1958 of gardens on the upper Sinaruco. And, in the neighborhood of the mission station, near Guachara and along the Caño del Medio and the Cunaviche River, all the Indians had horticulture. These Indians also reported gardens along the Arauca River. The linguist, Thomas P. Rootes, describes gardens along the Riecito and Sinaruco, and I have myself published in detail on Yaruro horticulture (1961 *a*).

In sum, present sources indicate horticulture for all Yaruro, going back at least to 1945 or 1946 and undoubtedly earlier — a period at maximum no more than twelve years after Petrullo's *dry-season* visit in 1934. It is hard to believe that the horticultural practice was diffused the length and breadth of Yaruro-land and integrated into a well-organized transhumance and even into the world view all in fifteen years. Nevertheless belief is not adequate proof. The only recourse is to try to resolve the problem by earlier evidence.

The second major difference between my findings and those of Petrullo relates to the asserted existence of matrilineal "clans", characterised, in localities, by a sib core of women and their children plus the locally inmarried husbands. Nowhere in Petrullo is proof given for the *unilineality* which is implied by the term clan, though the *matrifocality* seems genuinely confirmed by the genealogies reproduced. Matrifocality is not congruent with matrilineality, and, try as I might, I was not able to establish the latter. I am not ready to assert that matrilineality therefore does not, or did not, exist but I was quite unable to elicit any evidence for it.

A related aspect is, of course, exogamy. Petrullo claims that marriage can only occur reciprocally between the two clans, marriage *within* which would

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Second is the rate of deculturation. It is quite clear from comparing the material culture items observed by Petrullo with those that I observed, as well as from the present distribution of culture traits, which shows a gradient of trait loss as one goes from less acculturated to more acculturated groups, that the Yaruro once had a more elaborate culture content than at present. Though temporal extrapolations backwards can of course only be securely made by means of the written historical sources, items gleaned here and there from sources so far examined tend to confirm the inference from spatial distributions.[6] The implication of this is that the Yaruro were formerly considerably more complex, at least in their cultural content if not also in their cultural structure, than at the periods of ethnographic observation.

Third, a series of arguments concerning the ecological relations of the Yaruro to the land, and of the various tribes to each other and the food supply, could be presented which would suggest ecological specialization by tribal or subtribal groups among the Yaruro, Sáliva, Guahibo, Kuiva, Achagua, and Otomaco, all in a complex system (cf. Kirchhoff, 1948 *b*).

Fourth, an interesting ecological argument can be made which would resolve the disagreement about horticulture: that Petrullo's statement regarding horticulture might possibly be correct for the small, highly special area he studied and — the Orinoco sand bars and the estuary of the Capanaparo River in which wet-season flooding appears to be exceedingly extensive, hence sharply limiting horticultural possibilities — but that they do not apply to other zones of the llanos which do not have the ecological peculiarities of the river-mouth area.[7] I have discussed some aspects of this in previous publications, especially with regard to the importance of flooding, the area of gallery forest available for horticulture, and the pattern of transhumance (Leeds, 1961 *a*, especially pp. 13-18). An ecological-geographical survey of the entire region between the Orinoco highlands and the Andean spurs to the west is needed.

III

We may now turn to the question of written historical evidences. No published work on the Yaruro or the llanos has made use of much more than a dozen

[6] Cf. Crévaux, 1883: 570; Carriazo, 1910: 59; Acosta Saignes, 1961: 97, etc., as well as the loss of culture traits observable between Petrullo's and my visits.

[7] That this area is rather unique is clearly indicated by many maps which represent it as entirely flooded or as a welter of water-ways (cf. Gumilla, 1791). Acosta Saignes, in a foreword to Carvajal, points out that it was quite simple to mistake one river for another since, at least during the rainy season, they all flowed into each other near the mouth. The flooding makes any ordinary gardening impossible for a large part of the year. The hypothesis tends, however, to be contradicted by Le Besnerais's findings (1954; also, Leeds, 1961 *a*). It may be noted that in the almost absolutely flat Guachara area, between the Cunaviche and Arauca rivers, at the Indian village of Palmarito- much of the llanos floods. The loamy-mud soils are excellent for crops, but crops are only grown in those areas which remain a few inches or a foot or two above highest rainy-season water-level.

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social features reported, ideological features reported, and relations with other tribes mentioned. The card sets will be arranged by geographical location of the tribe so that for any given time period one may pull out all the sets and arrange the tribes in their spatial order. Thus for any time period a picture of the trait distributions, cultural-ecological conditions, inter-tribal socio-ecological relations, and acculturational-social contacts and events should be obtainable.

V

Though, to date, I have been concerned mainly with collecting bibliography and documentary materials rather than with their analysis, I should like to hazard several very tentative conclusions, or perhaps guesses, with respect to the ethnohistory of the llanos, and particularly of the Yaruro, based on the geographic, ethnographic, archeological, linguistic, and historical data known to me now. Some, however, are presented more as hypotheses for proof or disproof through continued research.

First, Petrullo's description is erroneous at least as respects the subsistence economy. Late Nineteenth Century travellers like Crévaux and Vela and several persons in this century mention horticulture. Still earlier reports go back to the earlier Eighteenth Century when missionaries speak of horticulture. Their reports apply to the Yaruro, Otomaco, Guahibo, and other groups. It has not yet been possible to decide whether they introduced or found horticulture among these peoples. Petrullo's error appears to have several explanations:

A) That he was incapacitated for several weeks by sore feet and was unable to travel about the land away from the rivers. In my experience, a careful criss-crossing of the land on foot is an absolute necessity if one is to know how these peoples carry on their subsistence activities. I have paced off with a pedometer the entire area used by the group I worked with. In the course of so doing I discovered all kinds of gardens, houses, and other evidences of their land use. These would not otherwise have been discovered by an observer nor mentioned by the Yaruro, since mainly what is physically present is, to them, worthy of mention.[10] I should say a great portion of my most important data came from such accidental discoveries made while walking about.

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[10] I would stand at a certain spot in a garden and ask "Whose garden is this?" "Juan's." Then I might walk perhaps ten feet and say, "Juan keeps his garden well." "But this is not Juan's garden." "You just said that this was Juan's garden." "That was over there on the other side of that row of corn." This happened a number of times. I also asked once, "Is there female shamanism here?" "No." Several days later, a group from an neighboring village came to visit. After an all-night session of the *tou'be*, several women performed shamanistic rites. I said, "I thought you said there is no female shamanism here?" "There isn't anyone here [i. e. in our locality] who practices — these women are from upstream." The same cleaving to locus was observed with respect to time. I was told that Miguel was a shaman ("musico"). I said "Miguel, are you not a musico?" "I am not a musico. I cannot sing." A few weeks later, he was singing. I said,

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B) Petrullo restricted his visits to the sand banks along and in the river, and, after his first arrival, most of his travelling was done on the streams. Gardens are never to be found on the sand banks and bars, but rather, usually, on the affluent creeks which are just above flood level of the rivers in the rainy season. Therefore he was not in a position to see the gardens which Le Besnerais later saw in the same area when he explored back from the river.

C) Petrullo was in the llanos in the dry season when the Yaruro move nearer the rivers both to secure a water supply as the water table lowers and to avail themselves of the much more plentiful and accessible river fauna[11] at a time when vegetable harvests are reduced because of drought. He was therefore observing dry-season subsistence — and perhaps only a part of it.

D) The probability that he observed only a part of the dry-season subsistence pattern in his area is reinforced by two considerations:

1) He reports the fact that 150 Yaruro had been massacred by Venezuelans a month before his arrival (p. 181). Their response under such circumstances is, as fast as possible, to get off the land that the Venezuelans want and to move to the rivers. I myself had occasion to observe such a diaspora, occurring in response to a smaller massacre. In view of this sort of response, it is likely, therefore, that Petrullo's group was living off river resources and away from their gardens at the time of his visit.

2) Maps indicate that in the lower part of the Capanaparo River, the flooding is greater and the number and size of side creeks suitable for horticulture is smaller than upstream on any of the large rivers. In other words, the available area for garden plots is much smaller, and riverine subsistence proportionately more important. Upriver, and more especially on the Sinaruco and on the middle and upper Cunaviche and Arauca rivers, there is much more tillable ground.

"I thought you said you could not sing and were not a musico?" "Yes, that was true last week when I had the grippe, but now my grippe is better I can be a musico again." And many similar examples of the extreme caution one needed to exercise regarding negative responses in order to be sure they were not merely descriptive of the place and moment. If Petrullo asked "Do you raise crops?", his informants would most likely have said, "No, we have no crops here", under the circumstances in which he found them.

[11] The river fauna is more plentiful and accessible in dry season because, first, it is more concentrated, and, second, it is more visible. During the wet, flooding season, fish, and other animals spread even into smaller streams and out upon the watery llanos — we caught a small piranha on the grassy, watercovered plain itself. On the plains, the fish are lost among the grasses and are virtually impossible to spear or shoot with bow and arrow. The river turbulence of the rainy season, meanwhile, has brought so much mud from further upstream that many of the rivers are opaque, especially in those parts of the llanos constructed of mud rather than sandy soils. Fish and the water reptiles and mammals are well-cloaked by the murky stream. The waters and the plains clear in the dry season so that the fish are concentrated in the limpid, grassless waters of the rivers, while land animals and riparian fauna are all crowded together near the banks in their search for food and water.

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Petrullo's own linguistic data includes the words for corn, *(pwa)*, manioc *(pae)*, and other planted foods. The words for corn and manioc are certainly not word borrowings from Spanish. This tends to confirm the hypothesis of an aboriginal presence at least of these crops.

A second point is that Yaruro and Guahibo subsistence is transhumant, consisting of a wet-season gardening predominance and a dry-season hunting and/or fishing predominance. Guahibo, both presently and in various historical sources,[12] are described as being horticulturalists as well as hunters. It is of first importance to note which season is being discussed when the tribal subsistence is being described. With this sort of transhumance, one would expect the decriptions in the literature to disagree; as they do, according to the season of description. Similarly there is much local ecological variation, which appears to determine variations in the predominance of horticulture or hunting or fishing or collecting.

Third, the various tribes — Yaruro, Guahibo, Kuiva, Síliva, Achagua, and possibly the Otomaco, as well as more distant groups -- maintained a complex ecological relationship to llanos and extra-llanos resources by means of three major institutions, trade, war, and raiding. For example Kuiva, described by my Yaruro informants and others as being "muy brabos",[13] even today raid both Guahibo and Yaruro villages, but apparently only when these are well supplied, *after* harvesting (Reichel-Dolmatoff, 1961). That is, they drain off a certain amount of the harvest surplus (cf. Leeds 1961 *a*: 23) from the horticultural groups. With this food, they are able to maintain a larger population in the hunting areas away from the rivers, which they regularly inhabit. Presumably it also compels or encourages the groups concerned to produce more as a hedge against such depredations, thus contributing to overall population maximinization. The raiding pattern may also account for the use of green corn as remarked before.

At the same time, the Guahibo raid Yaruro gardens as the corn and manioc ripen, but are limited from so doing by the frequent presence of Yaruro in their gardens during the harvest period and by the distance of the gardens from the Guahibo villages. The Guahibo were also reported as formerly having carried on extensive warfare, which, it is my guess, had a subsistence foundation (cf. Kirchhoff, 1948 *b*). The peaceable Yaruro, on the other hand, have apparently always done a considerable amount of trading up and down river in their canoes. Trade is also reflected archeologically in the stone artifacts mentioned above, since the kinds of stones used are not found in the llanos and must come from extra-llanos sources.

In short, the entire llanos area appears to me a complex ecological system involving hunting, gathering, fishing, and horticulture, with trade, raiding,

[12] Cf. Crévaux, 1883; Marcano, 1883; Reichel-Dolmatoff, 1944; Vela, 1889; Wilbert, 1957.

[13] Cf. Reichel-Dolmatoff, 1961. He described the generally harsh behavior of the men, the raiding pattern, and the rough manhandling he received from the women.

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and warfare as supra-tribal distribution mechanisms. It is interesting to note that the cultural characteristics ascribed to each of the peoples — "warlike," "peaceable," "brabo" — are ecologically funcional, in that they mirror value orientations which tend to drive people to maximize the food resources in ways appropriate to their socio-ecological environments.

Fourth, the evidence seems to me at present to point to the existence throughout the area, of pre-hispanic horticulture, enjoyed by at least some groups within each tribe, if not by all groups in part of every year. The evidence comes from the reports of travellers, missionaries, and from the archeological remnants, such as they at present are. The main Spanish and Venezuelan acculturational effects with respect to subsistence appear to have been the introduction of iron tools; seeds and plants not of native origin, such as sugar cane and bananas; and, here and there, cattle, pigs, or chickens.

Fifth, the evidence suggests a steady deculturation in an area capable of maintaining a more elaborate level of culture. One may hypothesize either that groups like the Yaruro came into the area with a level of culture reflected by the Arauquín-style remants and then gradually deculturated both pre-hispanically and in post-conquest times, to their present level, or that they intruded into such a culture at a time when they themselves were at a more elaborate level, and then deculturated largely under Spanish influence. It will probably be possible to shed light on this question with the historical data.

In summary, if these hypotheses are correct, the entire interpretation of the llanos area between the Andes and the Orinoco highlands, as well as of other nearby areas assertedly inhabited by so-called marginal tribes, is quite different from that presented by the *Handbook of South American Indians*. The marginals of northern South America seem to evanesce, and a picture of a highly complex ecological system in which horticulture is of central importance, even if not quantitatively predominant in this ecologically restricted area, appears. This picture seems to conform better to the recent archeological hypotheses of Cruxent and Rouse (1958-1959), to the historical mentions of horticulture, to the presently scanty archeological and linguistic materials, and to more recent ethnological data.

I have not, as yet, been able to make any determination whatever with respect to clanship, totemism, or matricross-cousin marriage. I hope that with a study of the word lists discovered and with possible older ethnographic data that this problem may be resolved. My own field data suggests an organization into demes with bilateral marriages between cross-cousins or between an ego and his parallel cousin's offspring. This interpretation incidentally tallies with, or at least does not contradict, the data, such as the genealogies, kin terminology, and locality features described by Petrullo in all pasages where inferences and assertions as to the existence of these institutions do not occur.